What drives fidelity to internet voting? Evidence from the roll–out of internet voting in Switzerland

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Abstract

To date, most of our knowledge regarding individuals' propensity to internet vote comes from cross sectional survey data. In this paper we try to break new ground by tracking individuals' actual behaviour over time. Specifically, we analyze citizens' choice of voting channel by exploiting a unique longitudinal dataset –the Canton of Geneva's vote registry database. Our aim is to explore patterns in the propensity to use internet voting among eligible voters. To this end, we first mine the registry data to identify a subset of voters that have experimented with internet voting. In a second stage, we explore the effects of key socio–demographic variables on individual voters' fidelity to internet voting. Our results are counter–intuitive. While the conventional wisdom is that younger voters are most likely to be mobilised to use the internet voting channel, we show that this is not the case in one of the few political systems where internet voting is readily available. Indeed, our evidence suggests that it is older voters rather than 'digital natives' (i.e., the younger voters) that are most likely to remain faithful to internet voting once they have experimented with it.

Keywords: Internet voting, Public policy, Federalism, Direct democracy, Data mining

1. Introduction

In recent years the debate on internet voting –hereafter abbreviated to iVoting– has moved from more theoretical debates about the prospects or perils associated with iVoting to one that is informed by the availability of empirical data. Significant trials involving iVoting have been conducted in a number of countries across the globe: Estonia (Solvak and Vassil, 2016), Norway (Segaard and Saglie, 2012; Segaard et al., 2014), Switzerland (Serdült et al., 2015b), The Netherlands and the UK in Europe, Australia (Smith, 2016), and Canada and the US in North America (Hall, 2015). Not surprisingly, given the range of political systems this encompasses, the type of election that has been the object of iVoting trials has varied across cases. In many instances the trials have focused on parliamentary elections, in the US it was the Democratic primaries, while in Switzerland the attention has been mostly on referendum votes. It has been common to first conduct experiments with low salience elections, such as local elections, before 'upgading' to higher salience national elections. The roll out of iVoting in Estonia neatly illustrates this dynamic (Alvarez et al., 2009; Solvak and Vassil, 2016).

From a global perspective, the two countries with the richest experience in the use of iVoting to date are Estonia and Switzerland -both with over a decade of experimentation behind them (Hall, 2015). In terms of lesson drawing, however, the two cases provide very different insights. Estonia and Switzerland are both small in global population terms (1.3 and 8.3 million inhabitants respectively) yet they differ quite markedly in their territorial structure. Whereas Estonia is a centralized and unitary state, Switzerland is one of the most decentralized federal systems in the world. This affects the implementation of iVoting, which is a largely bottom–up process in Switzerland driven by pioneer sub–national units compared to the top–down approach in Estonia (Mendez, 2010). This in turn has affected the roll out of iVoting, a piecemeal approach with competing systems among the sub–national units in Switzerland versus a unified and swiftly generalised national solution in Estonia (Mendez and Serdült, 2014). Lastly there is the object of the iVoting solution, in Estonia it is mostly geared towards elections while in Switzerland iVoting is mostly about referendums. This last point is important given the central role played by instruments of direct democracy, such as the referendum and the initiative, in the Swiss political system. In fact, in federalist Switzerland it is the cantons that are in charge of implementing referendum votes and elections, not only the sub–national ones but the national ones too. Another critical feature is the fact that remote forms of voting via mail are already generalized in the Swiss case. The iVoting procedure is therefore an additional channel of voting to pre–existing remote voting forms by mail.

In view of its federalised context, vibrant tradition of direct democracy and institutionalised forms of remote voting by mail, the potential for lesson drawing from the Swiss case will be especially pertinent for some of the classic federations. Possessing a somewhat atypical political system for a European country, Switzerland is often compared in the literature with the subnational units in the US with a tradition of direct democracy, such as California and Oregon, that have institutionalised the referendum and initiative procedures (Qvortrup, 2014). Indeed, as in Switzerland, these two US states have also more or less generalised voting by mail (in the case of Oregon it is the only form of voting) (on mail voting in the US see Gerber et al. (2013). The broader research question that therefore animates this paper is what happens when iVoting is introduced in such a federalised context and one where remote forms of voting are already well established. The focus is on individual voters that have experimented with iVoting. The specific research question is to what extent do voters remain loyal to the iVoting channel after having used it? Furthermore, which type of voter is more likely to remain faithful to iVoting and which type more likely to 'switch' among available voting channels.

Answering these research questions has some important policy implications that may be generalisable beyond the Swiss case. To tackle these questions we exploit a unique data source –the Canton of Geneva's vote registry database– which we use to track citizens' actual behaviour in terms of selecting among different available voting channels over time. The article proceeds as follows. We first review in Section 2 the literature on what we know about the profile of iVoters and derive four hypotheses to structure our investigation. Section 3 describes the dataset, our case selection and the methods used. Section 4 then presents the results of the empirical analysis while the concluding section discusses the implications of our work, as well as its limitations, and future research directions.

2. Theory and Hypotheses

We begin by reviewing the literature on what we know about iVoting and iVoters. We draw a distinction between empirical studies that focus on 'intent' to iVote, which are usually based on the hypothetical scenario of whether a prospective voter would use iVoting if given the opportunity (e.g. Powell et al. (2012); Christian Schaupp and Carter (2005); Choi and Kim (2012)), on the one hand, and empirical studies that are based on actual trials of iVoting on the other. It is the latter literature which constitutes our main point of theoretical departure (Table 1 provides an overview). Usually this literature covers cases where repeated

Table 1: Summary of main empirical studies dealing with the determinants iVoting

Author(s)	Case[1]	Year(s)	Publication[2]	Data Source[3]	*N* iVoters	Sample	D.V.[4]
Christin and Trechsel 2004	CH: Geneva	2004	Report	OS	1132	iVoters	NA
Christin and Trechsel 2005	CH: Geneva	2004	WP	S	123	Electorate	iVoting vs. Postal/Ballot
Serdült and Trechsel 2006	CH: Zurich	2005	Report	S	74	Electorate	iVoting vs. Postal/Ballot
Serdült 2010	CH: Geneva	2009	Proceedings	OS	2467	Expat	NA
				VR	4819	Expat population	iVoting vs. Postal/Ballot
Sciarini et al. 2013	CH: Geneva	2011	Report	S	207	Electorate	iVoting vs. Postal/Ballot
				OS	4908	iVoters	NA
				VRP	13310	Population	iVoting vs Postal ballot
Germann et al. 2014	CH: AG/BS/GR/SG	2011	Proceedings	S	110	Expat	iVoting vs Postal
Goodman 2014	Canada:Markham	2003	Chapter	OS	3655	Electorate	NA
Breuer and Trechsel 2006	Estonia	2005	Report	S	315	Electorate	iVoting vs Ballot
Trechsel et al. 2007	Estonia	2007	Report	S	367	Electorate	iVoting vs Ballot
Alvarez et al. 2009	Estonia	2005/2007	Journal	S	682	Electorate	iVoting vs Ballot
				VR	30275	Population	Descriptives
Bochsler 2010	Estonia	2007	WP	S	367	Electorate	iVoting vs Ballot
Alvarez and Nagler 2001	US: Primaries AZ	2000	WP	VR	35768	Democrats	iVoting vs. Postal/Ballot
Solop 2001	US: Primaries AZ	2000	Journal	S	318	Democrats	iVoting vs. Postal/Ballot
Prevost and Schaffner 2008	US: Primaries MI	2004	Journal	VR	4972	Democrats	iVoting vs. Postal/Ballot
Bergh and Christensen 2012	Norway: Local	2011	Chapter	S	1037	Electorate	iVoting vs non–Voters
				VR	27738	Population	iVoting vs Ballot
Henry 2003	UK: Local	2002	Proceedings	OS	3310	Electorate	NA

Note: The compilation of empirical studies draws on the meta–analysis in Serdült et al. (2015a).
[1] CH is an abbreviation for Switzerland.
[2] In the publications column WP refers to a Working Paper while Journal refers to a peer reviewed journal article.
[3] The abbreviations for the data source column are: S = Survey (in most cases a traditional telephone survey based on random sampling); OS = Online survey (iVoters that have been invited to fill in questionnaire after iVoting); VR = Vote registry data; VRP = Vote Registry Panel data (this only applies to longitudinal data where the same individuals are tracked).
[4] D.V. refers to the dependent variable of the study. Note, NA (not applicable) is used mostly for online surveys of iVoters. Typically such studies present descriptives of socio-demographic profiles rather than engage in statistical modeling exercises.

iVoting trials have been conducted, even if iVoting has subsequently been abandoned as in Norway or the UK. We first review what we know about the profile of iVoters, with greater attention to those cases where iVoting is becoming a more generalised feature of the electoral landscape (as listed in Table 1).

We begin by noting the columns in Table 1, which provides a meta–analysis of the empirical literature on iVoting.[1] Note that our focus is on country cases where significant trials of iVoting have taken place. There are six country cases that have generated some of the most important empirical studies on iVoting. Interestingly, not all countries have continued with their initial iVoting experimentation, as is the case for Norway and the UK. The type of election varies too. In many cases, experimentation has taken place at the local level, at least initially. Estonia is the only case that has generalized iVoting for what is usually considered first–order elections, i.e., general elections. The US cases all stem from two experiments with

[1]This draws on the extended meta–analysis provided in Serdült et al. (2015a).

iVoting for Democratic primaries in 2000 and 2004. While for Switzerland the examples are all related to referendum votes. The 'year' column covers the year of the trials that were studied. In most cases, the empirical studies are one–shot analyses dealing with a single trial although there are some that offer a longitudinal perspective. However, hardly any of these longitudinal studies draw on panel data, i.e. tracking the same individuals over time. In the case of (Goodman, 2014), the analysis involves comparing the aggregate descriptives at two time points. Other analyses are based on more fully specified statistical models involving two or more time points (Alvarez et al., 2009; Trechsel and Vassil, 2011). As far as we are aware, only one study, a report, uses a longitudinal panel study to track the same individuals over time for more than one time point, an approach that is close to the one adopted in this paper (Sciarini et al., 2013). This leads us to the 'publication' type column. What is immediately apparent here is the limited number of journal articles, by which we refer to peer reviewed papers. The top tier publications on the profile of iVoters have been studies based on either the US or Estonia. The remainder have generally been reports, conference proceedings or book chapters.

An important distinction among the various empirical studies is the type of data they draw on (see fifth column in Table 1). There are two main data sources, surveys and vote registry data. In a limited number of cases both data sources can be combined (repeated rows in Table 1). Surveys come in two general forms, the traditional survey based on random sampling and online surveys. One common approach in the design of the 'traditional' survey has been to oversample iVoters, especially in the earlier trials where the number of iVoters in the population is a small fraction of the total electorate (Alvarez et al., 2009; Serdült and Trechsel, 2006). The second type of survey, the online survey of iVoters, is based on respondents that opt–in to an invitation to complete an online survey after having iVoted. These types of designs are plagued by self–selection problems. For example the aggregate statistics presented by (Goodman, 2014) are based on an online survey with a response rate of less than 30 per cent of iVoters in some cases, which suggests caution when deriving conclusions about the socio-demographic profile of iVoters. Clearly, given the self–selection bias that can creep in with such designs, the traditional survey provides a much more reliable data source. Another important data source is provided by vote registry records. However, vote registry data is not always used for individual level tracking but rather to report summary statistics provided by the official sources (e.g. Alvarez et al. 2009). Furthermore, when vote registry data is used it tends to be cross–sectional, i.e., for a single time point (one exception is the longitudinal vote registry data used by Sciarini et al. 2013). Since it covers the population of interest, a longitudinal panel study based on vote registry data is ideally suited for tracking individuals' behaviour over time.

The data source column is closely connected to the number of iVoters and sample columns in Table 1. Obviously when vote registry data is used the N is much higher. Nonetheless, it is worth noting the large variability in the N of iVoters, especially those studies based on surveys. In terms of the sample drawn there are differences among studies. The traditional survey samples from the electorate, while online surveys typically draw samples from iVoters. In some cases, as in Serdült (2010), the sample is drawn from the ex-patriot iVoting electorate. With vote registry data there is no sample as such, instead the population (in this cases of registered voters) is analysed. In the US cases, however, it is the registered supporters of the Democratic Party.

In the last column of Table 1 we specify the dependent variable of the various studies. There is much variability in what is being studied, and in particular to which group(s) iVoters are being compared to (e.g. ballot voters, postal voters or non–voters). In many studies, such as those drawing on online surveys of iVoters, it is not even possible to compare iVoters to other groups (hence the NA in the relevant cells of Table 1). The latter studies tend to focus on the socio-demographic profile of those self–selected respondents that completed the questionnaires. In many cases it is misleading to even speak of a dependent variable since what is being presented are mostly aggregate descriptives. In general this variability renders any generalisation about the profiles of iVoters rather problematic. Still, as noted in the meta–analysis of Serdült et al. (2015a), a number of significant predictors appear to be associated with iVoting. Overall the age variable was most important, with young voters (not necessarily the youngest cohort however) being the most frequent users. On the other hand there is less consensus on the role of gender as a significant predictor even when drawing on the same data source (e.g. compare Bochsler (2010); Breuer and Trechsel (2006). More generally, where data on levels of IT use and knowledge were collected, such factors appeared to be generally more important drivers of iVoting than socio–economic factors.

Apart from studies that focus on the profile of iVoters and the determinants of iVoting, as listed in Table 1, the literature is also infused with some loftier theoretical –as well as normative– goals. One of these is the impact of introducing iVoting on turnout rates. There is good reason to be cautious about such expected effects. Although we are long aware that there are costs to voting (Downs, 1957), from a Downsian perspective the mere introduction of iVoting is unlikely to affect the ideological equilibrium of a political system or the saliency of an electoral event –factors that would certainly impact on participation. As pointed out by Riker and Ordeshook (1968) there is, however, a conveniency aspect to the calculus of voting –in terms of the time and effort spent. Indeed, recent studies have provided evidence on the importance of convenience as a driver of iVoting for the case of Estonia, specifically arguing that the probability of iVoting increases with distance to polling station (Solvak and Vassil, 2016). Furthermore, they have even suggested a potential mobilisation effect (i.e., inducing unlikely voters to turnout) for particular segments of the population (Solvak and Vassil, 2016).

In terms of conveniency factors, unlike Estonia, in the Swiss case the effects are most likely to be rather small given the availability and widespread adoption of postal voting. Nonetheless, iVoting does alter the voting period. Whereas postal voters have to mail the ballot on the Wednesday to be sure it arrives in time to be counted, the iVoter can wait until Saturday midday without having to leave the house (ballot box voters have until Sunday morning). Indeed, according to Sciarini et al. (2013) iVoters exhibit pattern of very late voting (in the last day and a half). While the convenience of iVoting seems unlikely to increase turnout, it might lead iVoters to stick to this channel once they have experienced it and found it easy to use.

This latter point leads to another range of theories that have been applied to iVoting, technology adoption models (TAM) and diffusion models. In terms of the TAM, Davis (1989) basically posits that ease of use and perceived usefulness are key for a technology to spread in a sustainable way, in our case to transform voting habits and make citizens switch from mainly postal to increasingly iVoting. The theory has been applied to iVoting adoption (Christian Schaupp and Carter, 2005; Choi and Kim, 2012). However, in both cases the focus was on ‘intent’ to iVote (rather than actual iVoting) and only included younger segments of the population. A more promising line of inquiry, drawing on the work of Rogers (2003) is the diffusion of innovation theory that has been applied to the Estonian case (Solvak and Vassil, 2016; Vassil et al., 2016). The central message here is that iVoting in the Estonian case can be modelled similarly to any other process of innovation diffusion with iVoters initially being a distinct subgroup but over time becoming virtually indistinguishable from ballot voters in terms of socio-demographic and attitudinal profiles.

This bring us neatly to the issue of repeated use of iVoting, what we have termed fidelity to iVoting. We are not the first to have pointed to the question of fidelity. Alvarez et al. (2009) mentioned a ‘faithfulness’ effect in their analysis of the Estonian case. Indeed, they state that “a very large proportion” of respondents to the telephone survey in 2007 that had used the iVoting channel for the previous 2005 election, continued to use the iVoting channel for the 2007 general election. This suggests a strong fidelity to iVoting effect, especially among the younger cohorts that are most likely to use iVoting in Estonia. In the context of the Canadian case of repeated trials between 2003 and 2010, Goodman (2014) has suggested that it is middle–aged and older voters that are more likely to iVote and that perhaps a high familiarity and use of the Internet are not such powerful preconditions for iVoting. While certainly interesting in terms of a potential fidelity effect over time, the drawback of this conclusion is that it is based on aggregate data –summary statistics of cross–sectional surveys based on self–reporting by iVoters.

Apart from these more ‘anecdotal’ speculations there has been very little empirical work on this dimension of interest. Two studies, however, stand out. The most detailed treatment of the fidelity effect to date, albeit one contained in a report that is dedicated to other aspects of iVoting, is by Sciarini et al. (2013). Using longitudinal panel data similar to our own, they suggest that the tendency to iVote over time diminishes by age, the older the less likely. However, their treatment of the topic is very dissimilar to ours and includes non iVoters.[2]. Solvak and Vassil (2016) provide by far the most theoretically sophisticated treatment of

[2]The Sciarini et al. (2013) report looks at two and three iVoting events, but only present summary statistics. When they do look at longer term trends their analysis focuses on the propensity to never iVote –a design that is very different to ours, which looks at fidelity towards iVoting for those that have iVoted.

the fidelity question, which is referred to as the 'stickiness' of iVoting. Drawing on social psychology theories appplied to habit association and turnout (Aldrich et al., 2011), they investigate whether iVoting in Estonia is becoming habit forming. The analysis is based on a cross–sectional surveys over a six election period that draws on respondents self–reporting on the mode of participation during previous electoral contests. The conclusion from the Estonian case is that, in parallel with iVoting's diffusion, there is a very strong 'stickiness' to iVoting, with previous iVoters between 13 to 19 times more likely to stick to the voting channel in subsequent elections (Solvak and Vassil, 2016). This effect conforms with a social psychological explanation of habit formation.

Inspired by what we know from the theoretical and empirical literature on iVoting we formulate four guiding hypotheses to structure the research. It is worth repeating that our research question differs from the most popular iVoting study design, i.e. comparing iVoters to traditional voters. Our data mining strategy is based on an individual level tracking of voters that have iVoted. The research question centres on explaining the determinants of remaining loyal to the iVoting channel or what others have called the 'stickiness' of iVoting (Solvak and Vassil, 2016). To test this fidelity effect it is therefore necessary for a voter to have selected the iVoting channel at least once. Having chosen the iVoting channel, we formulate the following hypotheses about the propensity to stick to iVote:

H1: *iVoting stickiness hypothesis.* Having selected the iVoting channel at t_1, voters are more likely to remain faithful to the channel at $t_2, t_3, t_{\ldots,n}$ than to switch back to their traditional voting channel.

H2: *Gender non–differentiation hypothesis.* The self–selection process involved in opting to use the iVoting channel will tend to diminish gender differences between male and female voters in the propensity to iVote.

H3: *Vote channel socialisation among digital natives hypothesis.* Younger voters that have iVoted are more likely to become socialised with the new channel and remain faithful to it in subsequent voting events.

H4: *Vote channel fidelity among seniors hypothesis.* Older voters that have iVoted are more likely to remain faithful to the voting channel in subsequent voting events.

The guiding hypotheses operate at various levels and on the basis of distinctive putative mechanisms. Drawing especially on the concept of iVoting's stickiness (Solvak and Vassil, 2016), H1 posits a strong fidelity effect. There is some evidence of this effect from previous studies including Alvarez et al. (2009) on the case of Estonia, where virtually all respondents that had used iVoting in the 2005 local elections reported using the iVoting channel for the 2007 general elections. Similarly, Sciarini et al. (2013) report a strong fidelity effect in two cross–tab tables based on two and three repeated iVoting events in Geneva. The proportion of voters that remained loyal to the iVoting channel for the two-event and three-event series was 65.3 and 69.3 per cent respectively. Our analysis extends over a much longer series, however, potentially a $t_1, t_2 ..., t_{10}$ data series (see Section 3 for more details). Contrary to H1, the remaining hypotheses posit specific individual level characteristics as potential drivers of iVoting fidelity.

We focus on gender for H2 because of data availability and previous meta-studies showing mixed results in relation to iVoting use (Serdült et al., 2015a). The argument behind H2 is that while men appear to be more likely to experiment with iVoting, our analysis is based on voters that have opted in to the iVoting channel in the first instance, a process of self–selection that may counter gender bias. Since we are not trying to explain who is more likely to opt–in to use the iVoting channel in the first instance but rather what drives fidelity to the iVoting channel over time, we have no reason to believe that there should be differences between a self–selected group of male and female voters. This also chimes with diffussion analyses in (Vassil et al., 2016; Solvak and Vassil, 2016) where gender does not play a role as well as more general studies on an overall shrinking gender gap in connectivity Hargittai and Shafer (2006).

The argument behind H3 is connected to notions of digital natives (Palfrey and Gasser, 2013). It flows directly from the insights of most empirical studies of iVoting that claim younger voters –though not necessarily the youngest cohort– are most likely to iVote. In short, those that have grown up and come of age as the internet has become ubiquitous are most likely to become socialised with this form of remote voting (Christian Schaupp and Carter, 2005; Choi and Kim, 2012).

The mechanism behind H4 parts from a different logic and is best understood in terms of the cost in learning to use iVoting. To begin with, iVoting requires voters to engage with new security measures. Once this initial learning investment has been incurred, and given their generally more conservative nature, we hypothesize that older voters are more likely to exhibit higher fidelity to the new voting channel. It should be noted that H3 and H4 are not rival hypotheses. It is possible to have higher propensities to stick to iVoting at the two extremes of the age cohort, and to do so for different reasons.We return to this issue in the analysis.

3. Case selection and methodology

3.1. Case selection

The dataset used in this analysis is a subset from the Geneva vote registry that includes data for 10 federal level referendum events, between June 2012 and September 2014. It should be noted that this is not an unusual level of referendum activity for Switzerland –a polity where citizens can be called to the polls 4–5 times a year on federal issues (more if one adds referendums at lower levels of political aggregation) (Linder, 2010). The analysis is restricted to this specific period for which we have data. It should be noted that not all municipalities –hereafter referred to as communes– in the canton of Geneva can be included. Geneva's iVoting trials have been available in only selected communes (about one third). Furthermore, even when iVoting has been available in a commune it has been frequently interrupted in some cases. It was necessary, therefore, to find a natural grouping of communes in which iVoting was available uninterruptedly during the period under study. Table 2 includes the list of the 23 communes that have provided for iVoting in the past. As can be seen in Table 2 there are 15 communes –which are marked by an asterisk– that have provided uninterrupted iVoting in the data series under consideration. These 15 communes constitute a natural grouping of communes that is ideally suited for exploring patterns in iVoting at the individual level.

3.2. Methodology

The selection of voters for conducting the individual level tracking involved two steps. We first identified all voters that had used iVoting at least once between the first and the fifth referendum event in Table 2. This returned an N of 9,711 voters that constitutes our

Table 2: Availability of iVoting across 23 communes in the Canton of Geneva for ten federal level referendum events between June 2012 (ev1) and September 2014 (ev10). The asterisk marks the communes that form a natural grouping on the basis of iVoting availability

Commune	ev1	ev2	ev3	ev4	ev5	ev6	ev7	ev8	ev9	ev10
Anieres*	x	x	x	x	x	x	x	x	x	x
Avully	-	-	x	-	-	-	-	-	-	-
Avusy*	x	x	x	x	x	x	x	x	x	x
Bardonnex	x	x	x	x	x	x	-	-	-	-
Bernex*	x	x	x	x	x	x	x	x	x	x
Carouge*	x	x	x	x	x	x	x	x	x	x
Cartigny	-	-	x	-	-	-	-	-	-	-
Celigny	-	-	x	-	-	-	-	-	-	-
Chancy	-	-	x	-	-	-	-	-	-	-
Chene-Bougeries*	x	x	x	x	x	x	x	x	x	x
Chene-Bourg*	x	x	x	x	x	x	x	x	x	x
Collonge-Bellerive*	x	x	x	x	x	x	x	x	x	x
Cologny*	x	x	x	x	x	x	x	x	x	x
Confignon*	x	x	x	x	x	x	x	x	x	x
LeGrand-Saconnex*	x	x	x	x	x	x	x	x	x	x
Meyrin*	x	x	x	x	x	x	x	x	x	x
Onex*	x	x	x	x	x	x	x	x	x	x
Perly-Certoux*	x	x	x	x	x	x	x	x	x	x
Plan-les-Ouates*	x	x	x	x	x	x	x	x	x	x
Thonex	-	-	-	-	-	-	-	-	-	-
Troinex	-	-	-	-	-	-	-	-	-	-
Vandoeuvres*	x	x	x	x	x	x	x	x	x	x
Versoix	-	-	-	-	-	-	-	-	-	-

baseline dataset. In Figure 1 we show the distribution of these voters per commune based on the case selection above. Having identified the voters in the baseline dataset, we then tracked their choice of voting channel for all subsequent electoral events until the last data point in our series, referendum event 10. More specifically, for each voter we compute a variable which we define as the propensity to iVote –essentially a relative frequency of iVoting for all voters in the dataset– that is calculated as follows:

$$P = \frac{\sum iVotes}{\sum Events} \tag{1}$$

Where P is an individual's propensity to internet vote; $\sum iVotes$ is the sum of sequential instances in which the voter has selected the iVoting channel (excluding the voter's first iVote experience); $\sum Events$ is the sum of referendum events in which the voter has turned out after their first iVoting experience (i.e., it excludes any abstentions on the part of the voter). This returns a variable with the range of 0–1. In the empirical analysis we use

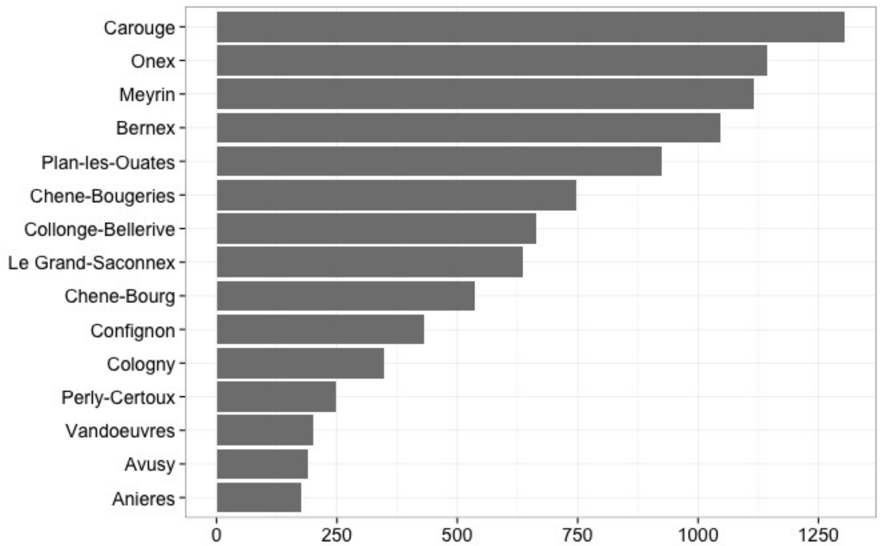

Figure 1: Distribution of voters per commune

the propensity to iVote variable as the outcome to be explained in the various regression analyses conducted. The choice of appropriate regression models to deal with a proportions dependent variable is further discussed in Section 4.

4. Empirical analysis

4.1. Descriptives

We begin by looking at some basic descriptives for the main explanatory variables used in the analysis. Table 3 presents the main variables with their relevant frequencies and proportions. The first three categories are among the few socio-demographics available in the vote registry dataset. The age variable consists of six age cohorts.[3] A core group of interest within the age cohort variable is the 'digital native' group of under–30 year olds, the first category. In terms of the gender category, there is some skew in the distribution with 46.6 percent female voters versus 53.4 percent male votes. Given that our baseline dataset is made up of individuals that have self–selected into using the iVoting channel at least once during the first five electoral events, and that the literature has suggested males are more

[3]Note we include separate analyses based on a non–transformed age variable in the appendix (e.g. see Table A.5).

Table 3: Descriptive statistics for main explanatory variables. Frequencies and proportions (per cent) relate to the number of voters.

Variable	Level	N	Percent
Age cohort	18–29	1,659	17.1
	30–39	1,506	15.5
	40–49	2,233	23.0
	50–59	2,009	20.7
	60–69	1,559	16.1
	70 +	745	7.7
Gender	Male	5,181	53.4
	Female	4,530	46.6
Civil status	Separated	1,020	10.5
	Single	2,767	28.5
	Married	5,924	61.0
Origin	Geneva	6,085	62.7
	Other	3,626	37.3
Voter type	Model	2,058	21.2
	Other	7,653	78.8
Commune type	Suburban	7,346	75.6
	High Income	2,365	24.4
N iVoting trials	Low	2,852	29.4
	Medium	2,744	28.3
	High	4,115	42.4

likely to iVote than females, the preponderance of male voters is not surprising. Indeed, we anticipated rather more skew in terms of the gender variable than was actually the case. For the civil status variable we use a three–fold category rather than the official codes, which include 12 different categories most of which are related to distinguishing between various forms of separation. These are all combined in a 'separated' category that includes divorcees.

Moving on to some of the voting related variables we include a voter's origin, which is a binary variable if the voter is a citizen of Geneva or from an 'other' canton of Switzerland. The 'other' category also includes foreign-born residents that have become naturalised Swiss citizens. These are the only two types of citizens with voting rights at the federal level.[4] The next variable, voter type, is essentially a dummy variable that takes on the value 'model' if the voter has participated in all referendum events in the data series.

[4]The ex–patriot community of Swiss living abroad also have voting rights, though we do not cover this group in the analysis.

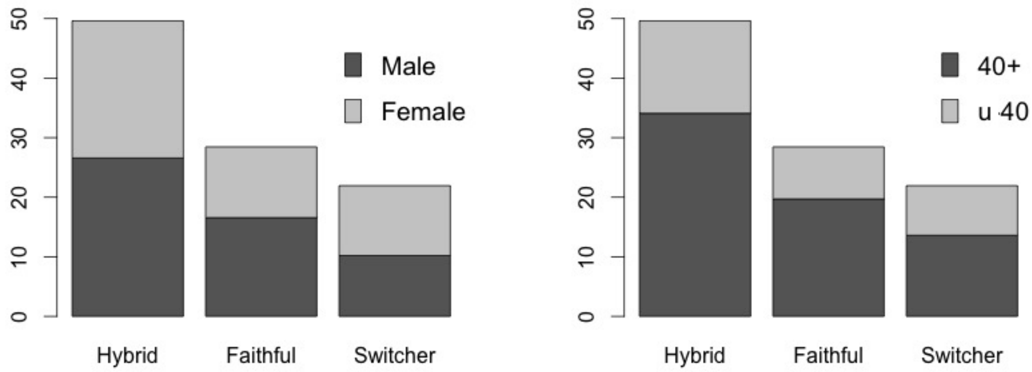

Figure 2: Fidelity to iVoting channel (by gender and age). 'Hybrid' voters are those have used both traditional voting channels and iVoting. The 'Switchers', have tried iVoting once and then switched back to their traditional voting channel, while 'Faithful' voters have always used the iVoting channel.

Lastly, we also include two variables related to the communal characteristics. We use the communal classification codes provided by the Swiss office of national statistics. Most of the voters reside in communes classified as 'suburban' although about a quarter of voters belong to so–called 'high income' communes. One last variable to be mentioned relates to the variability in communal experience with iVoting trials. The range is from 3–15 prior iVoting experiences for all the communes –though this also includes cantonal and communal iVoting rather than just federal level experiences. We split the variable into three categories where: 'low' refers to 3–7 prior iVoting trials, 'medium' is 8–11, and 'high' is iVoting 12–15 trials.

Having described the main variables we can now explore the distribution of the dependent variable. We first do this by creating a categorical variable from the propensity to iVote score. Figure 2 shows the categories of voters after their first iVoting experience. There are three possible types: (i) voters that remained totally 'faithful' to the iVoting channel for all subsequent referendum events; (ii) voters that 'switched' back to their original voting channel; and (iii) voters that exhibited 'hybrid' patterns of vote channel selection. In terms of any iVoting stickiness or fidelity effect what the Geneva individual level data show is this: although almost one third of voters (28.5 per cent) did remain faithful to the iVoting channel, the majority either switched back to their previous vote channel (21.9 per cent) or

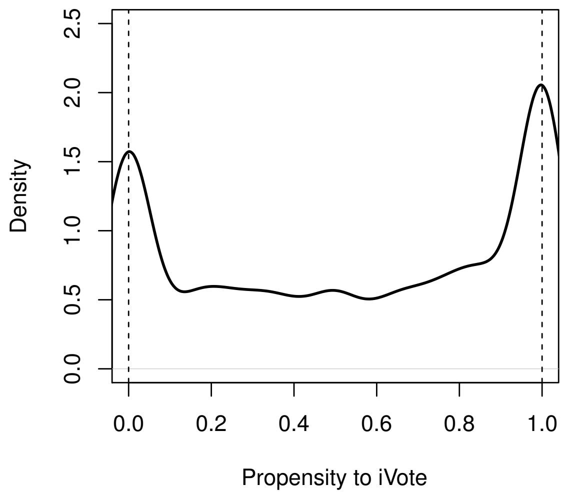

Figure 3: Kernel density plot for dependent variable with the the propensity to iVote on the x axis and the density on the y axis.

pursued hybrid strategies of mix and matching their vote channel (49.6 per cent). Figure 2 also shows the proportions based on the two main socio–demographic variables of interest, gender and age.

Moving away from a categorical depiction of the types of voters we now focus on the propensity to iVote, the dependent variable. Its distribution is shown in the kernel density plot of Figure 3. The propensity to iVote variable has some special properties, which are noted by the dashed line at the 0 and 1 values on the x axis. As previously mentioned above, around half have either remained totally loyal to this voting channel in all subsequent voting events (value 1) or abandoned the channel altogether (value 0). Between these two peaks lie the range of 'hybrid' voters that have switched between voting channels throughout the period of analysis. For a more thorough analysis we turn to an appropriate regression analysis.

4.2. Determinants of iVoting fidelity

We begin by noting the nature of the dependent variable we are seeking to explain, which is essentially a proportion. While an ordinary linear regression, such as an OLS, is not appropriate for dealing with proportions data there are models within the more flexible family of generalized linear models (GLMs) that are well suited to to the task. Since the analysis is conducted within the R statistical computing framework we follow the suggestions for dealing with proportions data in the leading R textbook by (Crawley, 2012) (see also Gelman and Hill 2006). The R environment offers a simple method for dealing with proportions data within a standard GLM framework. One key issue to address is the variability in sample size used to compute the proportion. For instance, a voter could have a propensity to iVote of 1, based on selecting the iVoting channel in event 1 and all subsequent referendum events thereafter, i.e., through to event 10. Since the first iVote is used to identify voters in the sample and then excluded, the numerator would be a count of 9 iVotes out of a possible 9 referendum events in the denominator. In another case a voter might have also used the iVoting channel at the first available instance, but only participated in two subsequent events. In this case the numerator would be 2 iVotes out of a sample of 2 referendum events as the denominator. In both cases the propensity to iVote would be 1, as described in equation (1) in Section 3. A simple way to account for this additional variability using a GLM within the R environment is to create a two-way outcome vector specifying the numerator and denominator defined in equation (1). The two-way outcome vector takes the following form: $[\sum iVotes, \sum Events - \sum iVotes]$ (for a data example see Crawley (2012)).[5]

A last step of the analysis is to use the quasibinomial link function when specifying the GLM regression model to account for overdispersion in the dependent variable.[6] A quasibinomial variance model can better deal with (0–1) data for which the variance is larger than would be the case with binomial data (0,1). While the logit coefficients in the model will be the same, the quasibinomial parameter in the model produces more robust estimates of standard errors and adjusts what would otherwise be overconfident inferences (Gelman and Hill, 2006).

There is an alternative approach to analysing the proportions data, which would be to

[5] An alternative is to simply use a weight function that takes on the value of the binomial denominator when fitting the GLM regression.

[6] This is connected to a technical point whereby a GLM with a binomial link assumes that the residual deviance is the same as the residual degrees of freedom. Where this is not the case, as is the case with our data, it means that there is extra, unexplained variation, over and above the binomial variance assumed by the model. To account for this a quasibinomial link should be used.

use a beta regression model (Cribari-Neto and Zeileis, 2010). While obviously well suited to the distribution of the propensity to iVote variable (as shown in the first plot in Figure 3), the drawback of a beta regression is that [0,1] values cannot be used in the model, i.e., the dependent variable can only take on values between 0 and 1. One approach to address this shortcoming, is to split the baseline dataset into two. The first subset would consist of voters whose iVoting propensity is either 0 or 1. In such a model the dependent variable would be categorical with 0 or 1 scores and a standard logistic regression could be fit on this subset of voters. For the remaining subset of voters whose propensity to iVote is between 0 and 1 (i.e. between the two dashed lines in the first plot Figure 3) a beta regression model could be used. We conduct this analysis in addition to the quasibinomial GLM models as a robustness check on the structural validity of our findings. The results in terms of our core variables of interest turn out to be similar to the quasibinomial GLM. We therefore relegate the reporting of these results to the Appendix.

For the remainder of this section we focus on the results from the quasibinomial GLM. Table 4 presents the results of three models that are fitted to the data, with each model adding additional variables. In the first model we use the basic socio-demographics: age cohort, gender and civil status. We find statistically significant effects for all three socio–demographic variables. The first two variables, age cohort and gender, are easy to interpret. The former appears to have a distinct effect across all age cohorts. Compared to the 30–39 age cohort, the digital natives (18–30 year olds) are less likely to remain faithful to the iVoting channel after having used it at least once. On the other hand, all age cohorts above the 30–39 reference category, right the way up to seniors who are 70 and above, are more likely to exhibit fidelity to the internet voting channel. Indeed, the logit estimates are highest for precisely this oldest age cohort. A significant effect is also present with regard to the gender variable, with females less likely to remain faithful to iVoting. With regard to civil status, there does appear to be significant difference between separated voters (this includes divorcees) on the one hand, and married and single (i.e, who have never married) voters on the other. However, we do not find that there are significant differences between single and married civil status when we change the reference category in the model.

In model 2, we add two voting related variables (see Table 4). The first, voter origin, suggests that there is no relationship between being a Geneva born citizen or a voter whose origin is from either another canton or a voter who has acquired Swiss nationality and resides in Geneva. This is important since more than one third of voters in our dataset are non Geneva born citizens –though this is not surprising since Geneva is a canton that attracts many Swiss citizens from other cantons as well as a high level of naturalised but foreign born citizens. While voter origin does not play a role the type of voter does. The 'model' citizen that participates in all referendum events, is also more likely to remain faithful to the iVoting channel. Controlling for these additional variables does not alter levels of significance of the core socio-demographic variables.

In the last model we add two variables related to the type of commune a voter resides in and its prior experience with iVoting trials. We find that the commune type does not matter. However, experience of prior iVoting trials does matter to a highly significant degree. Specifically, a voter residing in a commune with a low number of prior iVoting trials is less likely to remain faithful to the iVoting channel compared to a voter in a commune with an average or medium level of previous trials. Importantly, there is no significant difference between voters in communes with an average level of prior iVoting experiences compared to those in communes with higher levels. This suggests a possible reinforcement effect, whereby greater iVoting availability over time generates higher propensities to remain faithful to iVoting, which then stabilise after an initial trial period. A similar dynamic was also noted in the diffusion of iVoting analysis conducted by Vassil et al. (2016). Lastly, we also find that the core socio-demographic variables retain their levels of significance in model 3.

In terms of model selection, using a quasibinomial model means we cannot extract a typical information criterion, such as an AIC or BIC coefficient, to adjudicate between models.[7] However, a simple method is to use an ANOVA to compare the quasibinomial models and see whether there is statistically significant difference between them using an F measure test (Crawley, 2012). Doing so shows that there is a statistically significant difference between the models: model 1 compared to model 3 ($F_{1,5} = 13.46, p < .0001$);

[7] A quasibinomial model is not based on a maximum likelihood estimator. Although it is possible to obtain quasi AIC and BIC scores for the models, this additional analysis is not necessary since it is clear that it is necessary to retain the additional variables in model 3

Table 4: Quasibinomial GLM regression with logit estimates and robust standard errors in parenthesis.

	Model		
	(1)	(2)	(3)
Age cohort (ref:30–39)			
18–29	-0.145^{*}	-0.138^{*}	-0.169^{*}
	(0.065)	(0.066)	(0.066)
40–49	0.218^{***}	0.211^{***}	0.200^{***}
	(0.056)	(0.056)	(0.056)
50–59	0.166^{**}	0.157^{**}	0.142^{*}
	(0.057)	(0.057)	(0.057)
60–69	0.331^{***}	0.308^{***}	0.292^{***}
	(0.059)	(0.060)	(0.060)
70+	0.361^{***}	0.334^{***}	0.310^{***}
	(0.071)	(0.072)	(0.072)
Gender (ref: Male)			
Female	-0.276^{***}	-0.270^{***}	-0.276^{***}
	(0.032)	(0.032)	(0.032)
Civil Status (ref: Separated)			
Single	0.197^{**}	0.187^{**}	0.189^{**}
	(0.069)	(0.069)	(0.069)
Married	0.161^{**}	0.157^{**}	0.141^{**}
	(0.053)	(0.053)	(0.053)
Voter origin (ref: Other)			
Geneva		-0.044	-0.052
		(0.033)	(0.033)
Voter type (ref: Other)			
Model		0.091^{*}	0.092^{**}
		(0.036)	(0.036)
Commune type (ref: Suburban)			
High Income			-0.011
			(0.037)
Trials iVoting (ref: Average)			
Low			-0.225^{***}
			(0.042)
High			0.065
			(0.039)
Constant	0.077	0.179^{*}	0.254^{**}
	(0.069)	(0.077)	(0.082)
Observations	9,711	9,711	9,711
Note:	*p<0.05; **p<0.01; ***p<0.001		

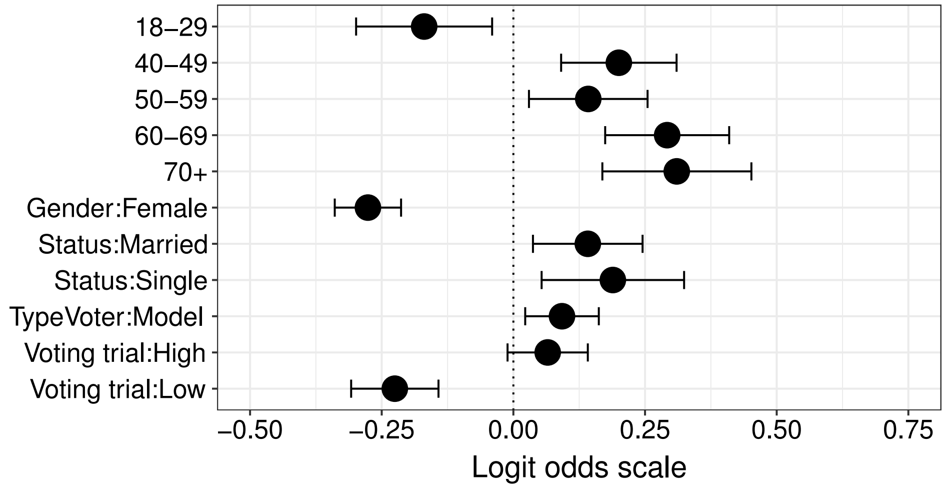

Figure 4: Dotplot chart showing the effect size of all statistically significant predictors in regression model 3. The logit odds estimates are on the x axis (with the horizontal error bars representing the 95% confidence intervals)

and model 2 compared to model 3 ($F_{1,3} = 19.62, p < .0001$). We therefore retain model 3. In Figure 4 we plot the differences in the coefficients among the statistically significant variables of model 3. The dotplot of logit estimates with 95 per cent confidence intervals for the main variables provides for a neat visualization of the differences in effect sizes. We can clearly see the differential effects among the different age cohorts, with negative coefficients for the digital natives (under 30 year olds), while the older cohorts have distinctively positive coefficients. Another evident feature is the gender effect with female voters less likely to be loyal to the iVoting channel than their male counterpart. On the other hand, the difference between a model citizen who always turns out and the rest, although significant, involves a very modest effect.

To get a better handle on our core variables of interest, age cohort and gender, we fit three additional models with binary transformations of the age variable. This allows us to compare under 25, under 30 and under 40 age cohorts versus the rest while also controlling for gender (see Table A.8 in Appendix for model specification and results). The resulting fitted values can be plotted in a three-way interaction plot as shown in Figure 5. Both age cohort and gender are statistically significant in all three models, though there is a difference in the slopes between under 25s on the one hand, and the two age cohorts of under 30s and under 40s. This provides further evidence that no matter how we classify the digital natives age cohort, older voters are more likely to remain loyal to iVoting. Furthermore, there is a clear gender differentiation in propensities to iVote. Proceeding clockwise, the last plot in Figure 5 uses the fitted values from model 3 in Table 4. It shows how the age cohort effect is being driven by the differences between the under 40 age cohorts on the one hand and the seniors, of 60 years and above, on the other.

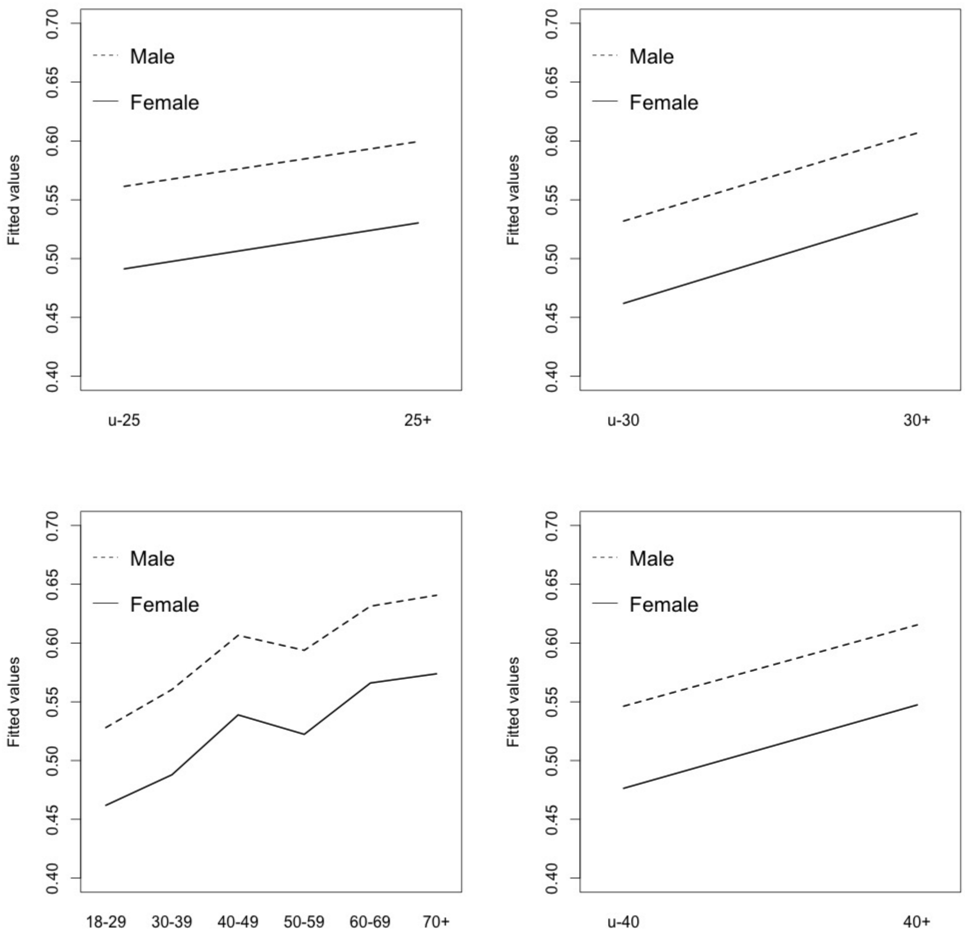

Figure 5: Three-way interaction plots with two categorical variables: age (on the x axis) and gender (different line type). On the y axis are the fitted values based on separate GLM quasibinomial models using three different binary age variables (under 25, under 30 and under 40 respectively). Note that both age and gender are significant predictors in all three models. The last model displays the fitted values from model 3 in Table 4 using all six age cohorts .

5. Discussion

This paper's main objective was to study the impact of introducing iVoting into a federalized political context in which other forms of remote voting by mail are already well–established. More specifically, we sought to explain the determinants of fidelity towards this new voting channel. Given its extensive experience with iVoting, including federal level votes, the Swiss canton of Geneva offers a unique setting for testing a number of hypotheses regarding iVoting dynamics. Fortunately, we were able to gain access to unique panel data, the canton's official vote registry database. We then drew on the findings from the main empirical studies of iVoting trials to date, to formulate four guiding hypotheses. Contra to Solvak and Vassil (2016), we did not find evidence of iVoting stickiness or any overarching fidelity effect among the voters that had experimented with iVoting. Although almost one third of voters did remain loyal to the iVoting channel the remaining two–thirds either abandoned iVoting or exhibited hybrid patterns in selecting among the available voting channels. This finding also contrasts with what others have suggested (Alvarez et al., 2009; Sciarini et al., 2013).

The three remaining hypotheses were related to the effect of individual level characteristics on the propensity to iVote. In view of the self–selection process in opting in to use iVoting in the first instance, hypothesis two posited a gender non–differentiation with regard to iVoting fidelity. We were aware that women are less likely to internet vote to begin with, as revealed by survey evidence. However, our baseline dataset was drawn from a group of voters that had already self-selected into using iVoting at least once. We expected that this self-selection process may have neutralised any gender effect. This was not the case though. The gender effect remains pronounced even when drawn from a population that have opted to use iVoting at least once –female voters are less likely than their male counterparts to remain loyal to the iVoting channel, and this effect is present across all age cohorts. We do not offer an explanation for this other than speculating that those characteristics that make women less likely to iVote in the first place may also carry through to women that do self–select into using iVoting. There may be a differential 'novelty effect' among gender types that is more pronounced for women than their male counterparts or a novelty effect among women might be induced by men living in same household –unfortunately we cannot test for this due to data restrictions.

The third hypothesis postulated a socialisation mechanism whereby digital natives' initial enthusiasm with iVoting would be reinforced over time. Such habit forming mechanisms have been shown to be at play in the case of Estonia (Solvak and Vassil, 2016). Our results were counter–intuitive regarding the age variable. Independently of how we measured age, the older the voter, the more likely he or she would remain faithful to iVoting. Thus, we found no support for the conventional wisdom: i.e., that the digital natives types are most likely to become socialised with the iVoting channel compared to other age cohorts. On the contrary, we found that they are most likely to abandon iVoting. One of the reasons for this unexpected outcome could potentially be linked to the fact that Geneva already has a very well established tradition of remote voting, that is postal voting, which is used by about 95 per cent of the electorate. Thus, digital natives can easily switch between two ultimately very convenient voting channels, postal voting and iVoting. The other side of the coin is that we did find supporting evidence for our fourth hypothesis related to a distinctive senior age cohort effect. We hypothesized a fidelity mechanism among seniors that had bothered to incur the initial learning costs associated with adapting to iVoting from more familiar channels. One potential explanation for this is that, having incurred the initial investment in adapting to the iVoting channel, seniors are more loath to abandon it and therefore more likely to remain loyal to the iVoting channel in subsequent referendum events.

We turn to issues of generalizability of our findings. As noted in the introduction, the two countries with most extensive experience of iVoting are Estonia and Switzerland. Lesson drawing from the former case is potentially more appropriate for small and unitary political systems, especially ones with more centralized forms of electoral administration and limited experience with other forms of remote voting such as postal voting. The Swiss case is very different in this regard. It is one of the 'classic' federations (Australia, Canada and the US are the others), and one which has a highly decentralised system for managing elections. Furthermore, it possessed a fully generalized system of remote voting, by mail, prior to the introduction of the iVoting channel. To that end, there are obvious lessons for other political systems sharing these characteristics, especially some of the US states that also have a vibrant tradition of direct democracy and generalised systems of voting by mail. What our findings show is that there is an important gender and age cohort effect. The latter has potentially more significant policy implications. We echo Goodman (2014), who has studied the Canadian experiences, in arguing that the introduction of iVoting may be more about making the electoral process more convenient for the older generation and less about serving as a tool for engaging the young. We find little evidence of iVoting socialization among the young and would be very sceptical of any purported turnout boost for this age cohort given the availability of iVoting. This seems to be especially the case in systems where the young already have at their disposal very convenient forms of voting such as postal voting.

Appendix A.

In this appendix we include additional analyses mentioned, but not presented in the main text. The inclusion of these additional models can be thought of as a 'robustness check', where the aim is to examine how 'core' variables behave when the specification is modified by adding or removing variables as well as presenting different transformations of the 'core' age cohort variable as in Table A.5. Overall, we interpret the stability of the performance of our 'core' variables as evidence of structural validity of the analysis in the main text. Nonetheless, there are some minor deviations that are illustrative. For instance, we find that when using age as a continuous predictor variable, the statistically significant, positive effect of being separated disappears (see Table A.5). We are therefore more confident that being married may have a positive effect on iVoting fidelity compared to separate and single voters. The significance levels and estimates for all other variables remain more or less the same. Most importantly, we also include the results from an alternative method of analysis based on a two subset transformation of the dataset. As mentioned in the main text, an alternative analysis is to split the dataset into two: (1) voters that always iVoted or gave up iVoting after their first iVoting experience, i.e., with values 0 or 1 in terms of their propensity to iVote and (2) the remaining voters with propensity to iVote scores between 0 and 1. For analysing subset (1) a logistic regression was used and for subset (2) a beta regression model was used. The results for each subset are presented in Tables A.6 and A.7. The results are essentially the same, albeit with higher logit estimates for the logistic regression and lower coefficients for the beta regression.

The last table A.8 presents the results of the regression models used to create the plots in 5.

Table A.5: Quasibinomial glm with age as continuous

	Model		
	(1)	(2)	(3)
age	0.008^{***}	0.008^{***}	0.008^{***}
	(0.001)	(0.001)	(0.001)
Female	-0.277^{***}	-0.271^{***}	-0.277^{***}
	(0.032)	(0.032)	(0.032)
Single	0.136^{*}	0.125	0.117
	(0.064)	(0.064)	(0.064)
Married	0.158^{**}	0.155^{**}	0.139^{**}
	(0.053)	(0.053)	(0.053)
Origin:Geneva		-0.044	-0.052
		(0.033)	(0.033)
VoterType:Model		0.098^{**}	0.098^{**}
		(0.036)	(0.036)
CommuneType:High Income			-0.015
			(0.037)
iVoting trials: Low			-0.223^{***}
			(0.042)
iVoting trials: High			0.064
			(0.039)
Constant	-0.156	-0.122	-0.053
	(0.086)	(0.089)	(0.093)
Observations	9,711	9,711	9,711
Note:	*p<0.05; **p<0.01; ***p<0.001		

Table A.6: Logistic regression on subset of voters with values 0 or 1 in terms of propensity to iVote. Logit estimates with standard errors in parentheses.

	Model		
	(1)	(2)	(3)
18–30	-0.248^{***}	-0.236^{***}	-0.288^{***}
	(0.052)	(0.052)	(0.053)
40–49	0.321^{***}	0.311^{***}	0.280^{***}
	(0.045)	(0.045)	(0.045)
50–59	0.232^{***}	0.215^{***}	0.188^{***}
	(0.046)	(0.046)	(0.046)
60–69	0.508^{***}	0.467^{***}	0.427^{***}
	(0.047)	(0.048)	(0.048)
70+	0.522^{***}	0.488^{***}	0.430^{***}
	(0.056)	(0.056)	(0.057)
Female	-0.474^{***}	-0.466^{***}	-0.476^{***}
	(0.026)	(0.026)	(0.026)
Single	0.292^{***}	0.281^{***}	0.283^{***}
	(0.055)	(0.055)	(0.055)
Married	0.235^{***}	0.227^{***}	0.208^{***}
	(0.042)	(0.042)	(0.042)
Origin:Geneva		-0.033	-0.040
		(0.027)	(0.027)
TypeVoter:Model		0.157^{***}	0.154^{***}
		(0.029)	(0.029)
Commune:High Income			-0.055
			(0.030)
iVoting trials:Low			-0.358^{***}
			(0.034)
iVoting trials:High			0.055
			(0.031)
Constant	0.176^{**}	0.168^{**}	0.315^{***}
	(0.054)	(0.057)	(0.061)
Observations	4,893	4,893	4,893
Log Likelihood	−17,120.330	−17,104.800	−17,011.570
Note:			*p<0.05; **p<0.01; ***p<0.001

Table A.7: Beta regression on subset of voters with values on the dependent variable propensity to iVote between 0–1. Logit estimates with standard errors in parentheses.

	Model		
	(1)	(2)	(3)
18–30	−0.037	−0.034	−0.052*
	(0.023)	(0.023)	(0.023)
40–49	0.133***	0.129***	0.126***
	(0.019)	(0.019)	(0.019)
50–59	0.115***	0.110***	0.104***
	(0.020)	(0.020)	(0.020)
60–69	0.159***	0.149***	0.143***
	(0.021)	(0.021)	(0.021)
70+	0.177***	0.160***	0.153***
	(0.025)	(0.025)	(0.025)
Female	−0.095***	−0.091***	−0.096***
	(0.011)	(0.011)	(0.011)
Single	0.094***	0.089***	0.091***
	(0.024)	(0.024)	(0.024)
Married	0.087***	0.087***	0.077***
	(0.019)	(0.019)	(0.019)
Origin Geneva		−0.028*	−0.033**
		(0.011)	(0.011)
VoterType:Model		0.045***	0.047***
		(0.012)	(0.012)
CommuneType: High Income			0.024
			(0.013)
iVoting trials: Low			−0.097***
			(0.015)
iVoting trials: High			0.054***
			(0.013)
Constant	−0.007	0.002	0.020
	(0.024)	(0.025)	(0.027)
Observations	4,818	4,818	4,818
Log Likelihood	2,259	2,269	2,339
Note:			*p<0.05; **p<0.01; ***p<0.001

Table A.8: Quasibinomial regression with the age predictor as a binary variable among different digital native cohorts. Logit estimates with standard errors in parentheses. The fitted values from these models were used to construct the interaction plots in Figure 5.

	Model		
	(1)	(2)	(3)
under–25	-0.156^{**}		
	(0.056)		
under–30		-0.306^{***}	
		(0.045)	
under–40			-0.285^{***}
			(0.035)
Female	-0.282^{***}	-0.280^{***}	-0.280^{***}
	(0.032)	(0.032)	(0.032)
Constant	0.403^{***}	0.434^{***}	0.470^{***}
	(0.022)	(0.023)	(0.024)
Observations	9,711	9,711	9,711
Note:	*p<0.05; **p<0.01; ***p<0.001		

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